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MEMORANDUM

TO: M. C. Vandall DATE: April 12, 1976

THROUGH: John T. Egan

FROM: Michael A. Apgar

SUBJECT: Supplemental Appropriation for Investigation of Ground Water Pollution from the Delaware Sand and Gravel Company Landfill

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A draft of the above-referenced application is attached. The application includes a brief narrative describing the request for the investigation, the proposed scope of work and the estimated costs and manpower associated with this effort. If you have any questions or final recommendations on this matter, please contact me.

I have excellent slides of the Llangollen and Delaware Sand landfills which will be helpful in any presentation on this matter. I request the opportunity to aid in and be present at any presentation made.

cc: Dr. Harry W. Otto

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APPLICATION FOR A SUPPLEMENTAL APPROPRIATION FOR ASSESSMENT OF THE IMPACT OF THE DELAWARE SAND & GRAVEL COMPANY LANDFILL ON WATER QUALITY IN THE UNDERLYING POTOMAC AQUIFER

Introduction: The Delaware Sand & Gravel Company landfill is an industrial landfill constructed in a gravel pit excavation 1½ miles southwest of the City of New Castle, Delaware. The landfill location is shown on Figure 1. The landfill has been operated since 1969. For the past several years the wastes have consisted principally of paper, cardboard, wood, tires, and plastic film, powders and foam. Smaller amounts of domestic trash, waste sludges, and chemical residues are incorporated in the fill. In the past, liquid chemical wastes were accepted at the site in large volumes.

The landfill overlies a portion of a major ground water reservoir (the upper Potomac aquifer) which has been contaminated by polluted water leaching from the old Llangollen landfill. This aquifer is capable of supplying approximately 6 million gallons of water per day in the 2 square mile area around the landfill to large capacity wells operated by the Artesian Water Company and Amoco Chemical Corporation.

The Llangollen landfill is constructed in a former gravel pit immediately west of the D. S. & G. property. (see Figure 1) Contamination of the water of the upper Potomac aquifer was discovered in a domestic well 600 feet south of the Llangollen landfill in 1972. Since that time, the New Castle County Department of Public Works has conducted an intensive program to halt the spread of pollutants in the aquifer and to stop the pollution completely. Several millions of dollars have been spent to date. The County and its consultants have determined that the best way to stop the pollution problem will be to excavate the entire Llangollen landfill and move it to a specially lined area in the as yet unfilled area of the Delaware Sand and Gravel pit.

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FIGURE 2

GEOLOGIC CROSS SECTION THROUGH LANDFILLS

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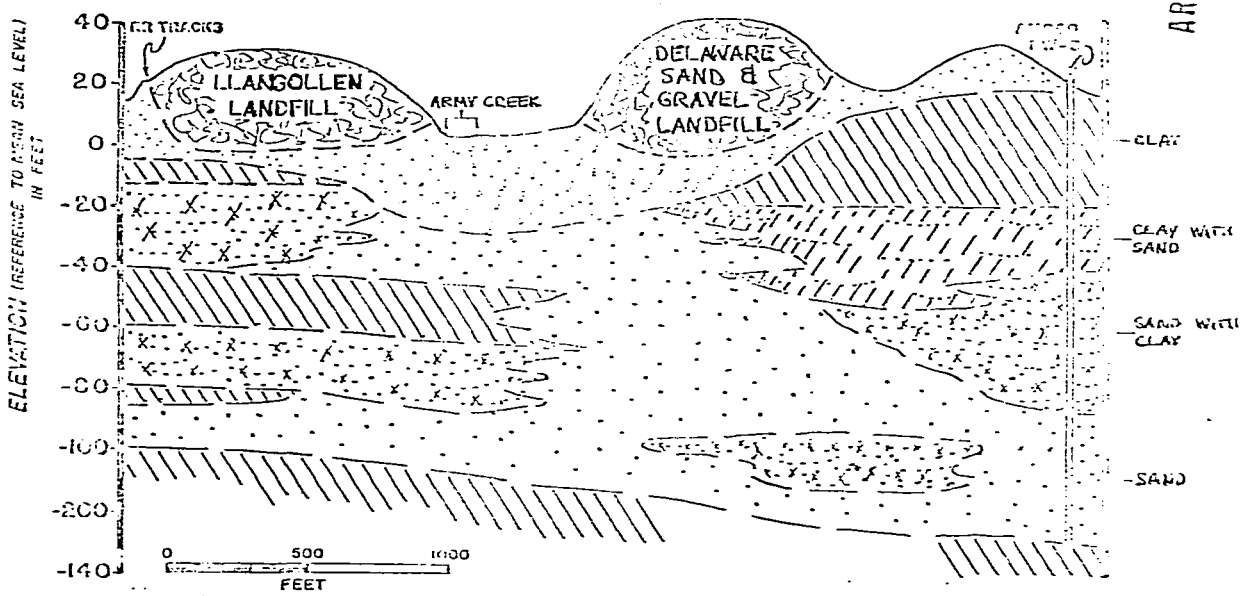
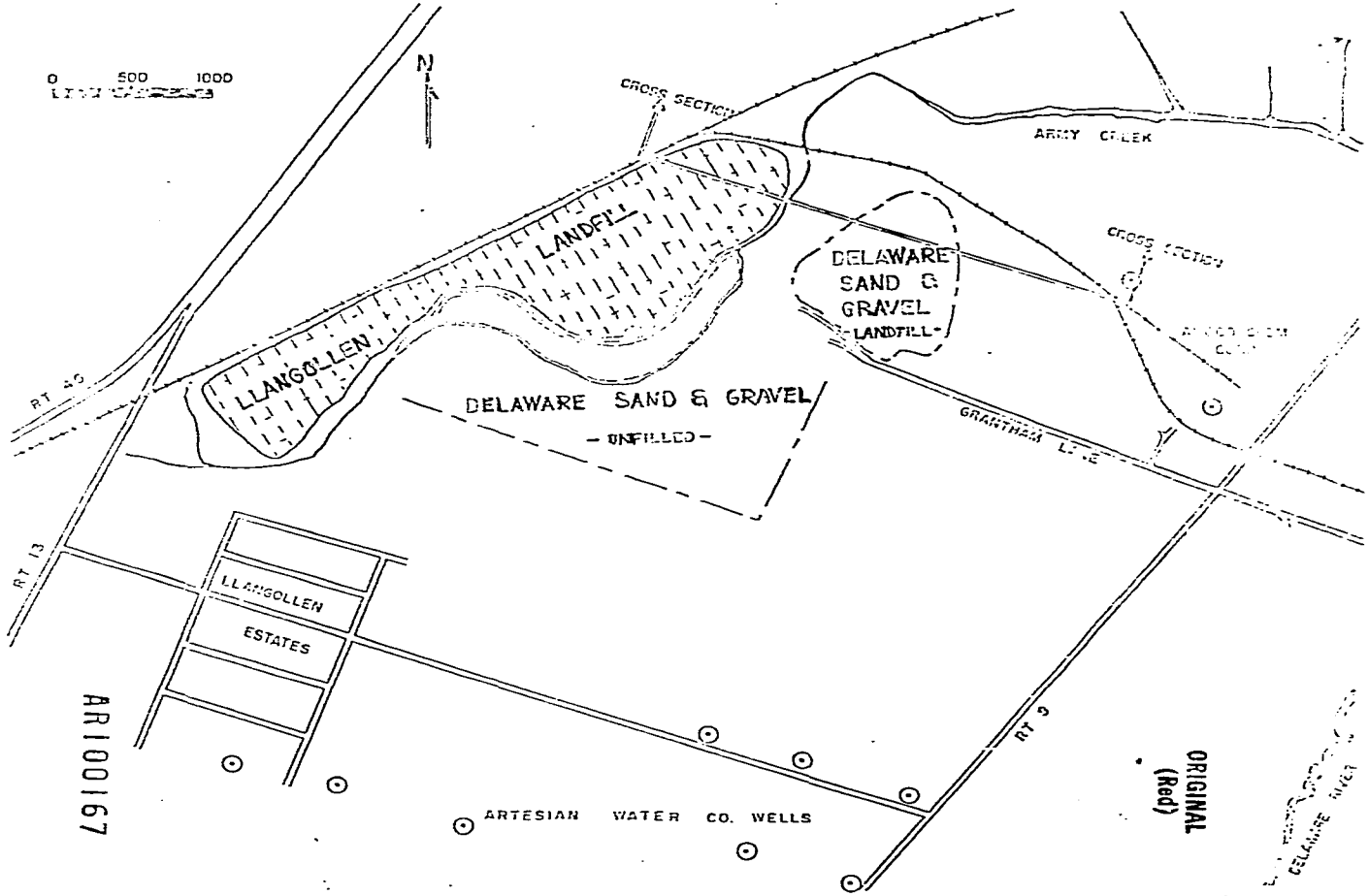


FIGURE 1



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Objective: Determination of the specific contribution of pollutants to the Potomac aquifer from the D. S. & G. Company landfill is important in deciding:

1 - whether to permit continued operation of the landfill in this pollution-susceptible area, and, if so, under what conditions, and

2 - whether reconstruction of the Llangollen landfill will solve the pollution problem of the aquifer, or whether the contribution of pollutants from the existing D. S. & G. landfill will have to be controlled as well.

Discussion: The existing pollution in the upper Potomac aquifer beneath the D.S.&G. landfill are derived at least in part to leakage of contaminants from the Llangollen landfill. It will be difficult to differentiate between the Llangollen-generated contaminants from pollutants suspected to be leaching downward from the D. S. & G. landfill. Figure 2 is a geologic cross-section through the Llangollen and D. S. & G. landfills.

The heavy pumpage of water from the deeper (Potomac) sands by Artesian Water Company and Amoco Chemical Corperation has reduced the water pressure in the deep sands and caused water to move downward from the surficial sands in which the landfills are constructed. Unfortunately because of the geologic conditions, water polluted by contact with the refuse in both landfills and liquid chemicals dumped into the landfills have a direct path down into the Potomac sands.

Drilling wells in the landfill will require the services of a professional water well contractor with a rotary drilling machine. Two previous low budget attempts to install small diameter monitor wells with a well driving rig and with an auger rig met with failure because of:

1 - inability to get through the trash

2 - difficulty in assessing the nature of material penetrated and where to set the well screen, and

3 - difficulty in developing and clearing the wells so that they produced water.

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Scope of work: Six pairs of wells would be drilled into and through, or adjacent to the D. S. & G. landfill. One well in each pair would be completed in the surficial sand in which the landfill is constructed and the other well would be completed in the underlying Potomac sand. These wells would be used to determine:

1. Characteristics of the sediments beneath and adjacent to the D.S.&G. landfill
2. Gross characteristics of the wastes in the landfill:
   a. types & present condition
   b. cover material
   c. thickness
   d. depth
   e. degree of saturation
3. Hydrologic conditions beneath the landfill
   a. hydraulic heads and ground water flow patterns in
      i) the landfill and adjacent surficial sand
      ii) the underlying Upper Potomac aquifer
      iii) head differences between the surficial sand and the Upper Potomac aquifer and the approximate rates of vertical leakage between the two systems
4. Ground water quality
   a. in the landfill
   b. in Pleistocene sands adjacent to the landfill
   c. in the underlying upper Potomac aquifer. Use will be made of existing information and wells drilled as part of the Llangollen project for water level measurement and sampling in this case.

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Chemical analyses involving 20 samples limited to the following parameters:

pH	NH_3	Fe	Pb
Cl	NO_3	Zn	Hg
TDS	NO_2	Ni	As
Spec Cond	TKN	Cr	
	SO_4	TOC	Cd

Gas Chromatographic analyses will be limited to volatile acids and neutral and basic extracts. Parameters on these three will include organic nitrogen, organosulfurs, organophosphates, and chlorinated hydrocarbons. These determinations will include comparisons of chromatographic peaks with suspected sources. Confirmation and identification of suspected peaks will require mass spectrophotometric analysis by EPA on a subcontract basis, costs for which have been included in this project.

Work Program Items and Associated Cost Estimates:

DNREC (Water Supply)Tasks	Man Days
Well Specs and Contractor selection	3
Well site selection	1
Drilling & Well construction supervision	20
Water level measurement and water sample collection	6
Data interpretation	2
Report	12
Graphics	2
Typing	2
	48

Subcontract Services

Surveying well locations and elevations	$500	ORIGINAL (Red)
Mobilization & Drilling 800' x 4" casing	13000	
	$135000	

Equipment purchases (DNREC)

2 Submersible pumps	$1000
2 Water level recorders	850
	$1850

Water Quality analysis (DNREC, Technical Services)
(includes $1500 subcontract analytical work) $9505

Total Costs

$24855

46 man days from Water Supply

Estimated duration of program: 3 months